

LARF Status

3D Field and Detector Response Calculations

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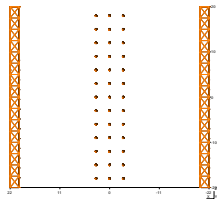
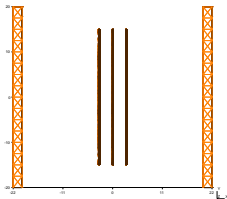
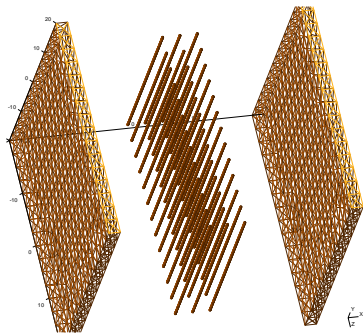
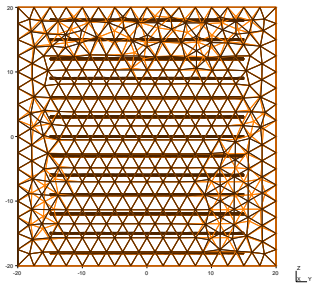
Outline

Parallel Wires

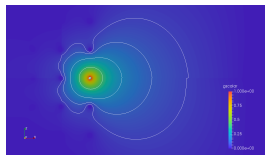
MicroBooNE Geometry

To Do

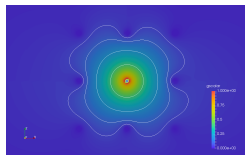
Parallel Wires for “Fake” 2D



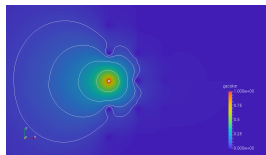
Parallel Wires - Slice Through Weighting Potentials



U plane



V plane



W plane

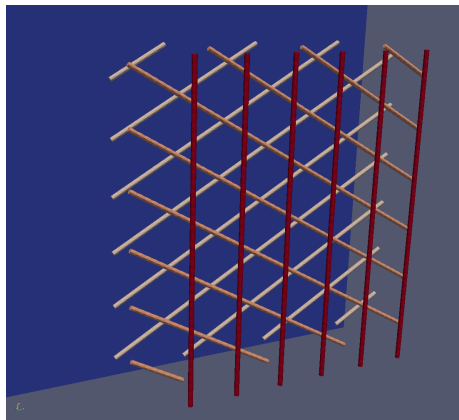
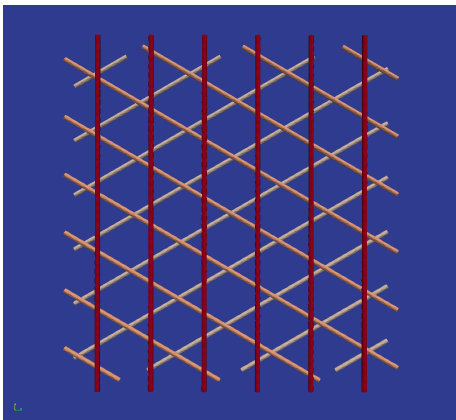
- X-Z slice through plane of symmetry ($Y=0$).
- Color shows weighting potential: 0-100%.
- Lines: 5%, 10%, 20%, 40% weights.
- Gaussian quadrature imprecision visible in some jaggy contours lines.
- Small spatial fluctuations near wires, but somewhat obscured.
 - Note: inside wire is $\sim 0V$, square shape is pixelization.

Visual comparison with Bo's 2D fields show good agreement.
For now, consider this enough validation to move forward.

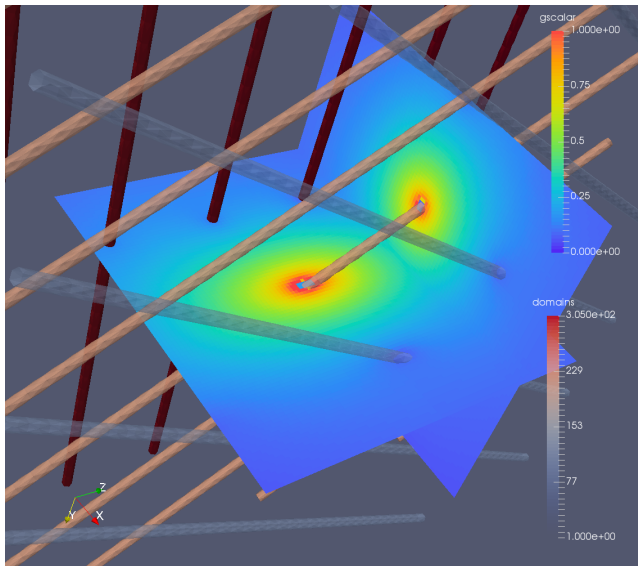
Where I'm at

- MicroBooNE geometry
- 20mm patch of wire planes + single plane providing applied potential.
- 3D potentials: drift + weight for middle U, V and W wires
- Coarse 0.5mm voxel field evaluations spanning +/- 20mm
- Fine 0.1mm voxel field evaluations spanning +/- 5mm
- Can step in `paraview` for display
- Can step in my code to collect current waveforms.

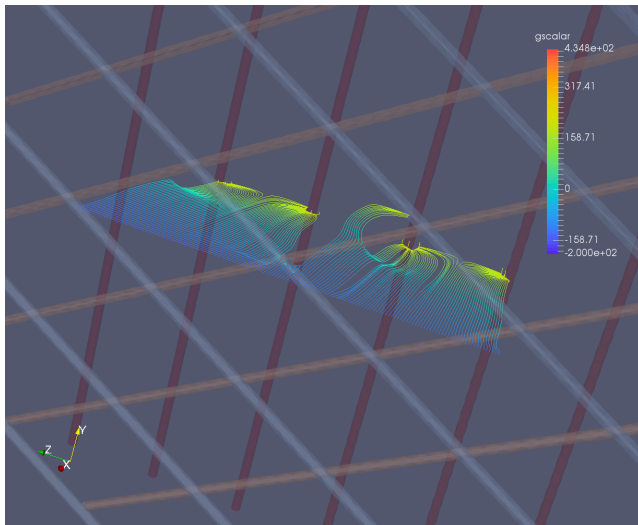
Wire Geometry with Cathode Plane



U weighting field slices



Paraview stepping from line source



Next steps

- Compute limitations need some s/w dev workarounds:
 - CPU limited need finer meshing at wire ends, but want coarser in middle to save CPU. Needs a custom mesh alg.
 - RAM limited: evaluate field in batches over sub-volumes, finer grid near surfaces.
- Now have all the pieces for producing response functions, just need to bring them all together.
- More validation (continuing to collaborate with Leon).
- Xin, *"may need to enlarge problem to +/- 10 wires"*.
 - Need to reiterate through the stack of geometry, meshing, fields, stepping. More computing limits expected.